

In the Specification:

Please replace the paragraph beginning on page 2, line 23 with the following amended paragraph:

Moreover, a liquid crystal display device 180 of a conventional example 3 shown in Fig. 25 is characterized by including: a liquid crystal display panel 13; a diffusion plate 1 which is arranged behind the liquid crystal display panel; a light guide plate 18 which is arranged behind the diffusion plate 1; a transparent plate 16 which is set behind the light guide plate 18; a ~~substrate~~ substrate 4 which is set behind the transparent plate 16 and includes red light-emitting LEDs 7, blue light-emitting VFDs (vacuum fluorescent displays) 17, green light-emitting LEDs 9 and a reflection plate 2 which is arranged so as to be laid among the LEDs and the VFDs; and sidelights 20 which are arranged on the sides of the light guide plate 18, and in that the red light-emitting LEDs 7, the blue light-emitting VFDs 17 and the green light-emitting LEDs 9 can emit light independently for each single color and are lit almost simultaneously in a short time and in order for obtaining white light (JP-A-6-018882, JP-A-2002-258815). In addition, in the liquid crystal display device 180 of the conventional example 3, light from the LEDs is transmitted through the transparent plate 16 to be made incident on the light guide plate 18, mixed, and diffused on the diffusion plate 1, whereby surface lighting is supplied to the liquid crystal display panel 13. Further, the reflection plate 2 is useful for returning the light, which has returned from the diffusion plate 1 or the transparent plate 16, to the liquid crystal display panel 13 again, and increasing luminance of the surface lighting. Here, the reflection plate 2 is set so as to avoid a metal-

embedded PCB 5, on which a circuit for driving light-emitting elements such as the red LED 7 or wiring for sending signals is disposed, as structural example 2 of an LED part and a reflection plate in the conventional example 3 shown in Fig. 26.

Please replace the paragraph beginning on page 11, line 7 with the following amended paragraph:

A surface lighting ~~device~~ device 30 shown in Fig. 1 includes; linear light sources in which LED elements 3 are arranged continuously; a reflection plate 2 which fills spaces among the LED elements 3; a substrate 4 on which the LED elements 3 and the reflection plate 2 are set and which is made of a material such as an aluminum plate and also serves as a heat radiation plate; and a diffusion plate 1 which is located in an upper position and is transparent but diffuses light. Here, the reflection plate 2 which fills spaces among the LED elements 3 means the reflection plate 2 which is arranged on a metal-embedded PCB 5, on which non-light-emitting portions of the LED elements 3 and wiring or a circuit for driving the LED elements 3 are disposed, as shown in a sectional view and a plan view illustrating an example 1-1 of structures of an LED portion and a reflection plate in a first embodiment of Fig. 2. In addition, the reflection plate 2 which fills spaces among the LED elements 3 may be the reflection plate 2 having through-holes in which the light-emitting portions of the LED elements 3 fit are opened such that the reflection plate 2 covers portions other than the LED light-emitting portion as shown in a sectional view and a plan view

illustrating an example 1-2 of structures of an LED portion and a reflection plate in the first embodiment of Fig. 3.

Please replace the paragraph beginning on page 12, line 10 with the following amended paragraph:

Here, concerning an example 2 of structures of an LED portion and a reflection plate in a conventional example 3, an example 1-1 (Figure 2) of structures of an LED portion and reflection plate in a ~~third~~ first embodiment and an example 1-2 (Figure 3) of structures of an LED portion and a reflection plate in the ~~third~~ first embodiment, a rate of a reflection plate covering a substrate surface is calculated, and light use efficiency, which is a ratio of an amount of light transmitted through a diffusion plate and an amount of emitted light, is also calculated, and results of the calculation are arranged in table 1 such that the results can be compared. Note that, in calculating the surface cover rate and the light use efficiency, the calculation was performed with conditions that a diameter of a lens of an LED element was 6 mm, a width of a reflection plate was 24 mm, a line pitch of liner light sources consisting of LED elements was 120 mm, and a gain of the reflection plate was 0.8. In addition, as a material of the reflection plate, an aluminum plate, white polyester (foamed and mixed with a diffusion material), and silver vapor deposition polyester are possible. However, in the calculation of the light use efficiency, it was assumed that white polyester was used.

Please replace the paragraph beginning on page 13, line 12 with the following amended paragraph:

A surface lighting ~~device~~ device 40 shown in Fig. 4 includes: linear light sources in which LED elements 3 having prisms 6 adhered to light-emitting surfaces thereof are arranged continuously; the reflection plate 2 which fills spaces among the LED elements 3; the substrate 4 on which the LED elements 3 and the reflection plate 2 are set and which is made of a material such as an aluminum plate and also serves as a heat radiation plate; and the diffusion plate 1 which is located in an upper position and is transparent but diffuses light. Here, in Fig. 4, the reflection plate 2 which fills spaces among the LED elements 3 simply means the reflection plate 2 which fills the spaces among the LED elements 3 as in the conventional example. However, the reflection plate 2 which fills spaces among the LED elements 3 may be the reflection plate 2 which fills spaces among LED elements as shown in Figs. 2 and 3.

Please replace the paragraph beginning on page 15, line 19 with the following amended paragraph:

A surface lighting ~~device~~ device 50 shown in Fig. 7 is characterized by including; linear light sources in which the LED elements 3 are arranged continuously; the reflection plate 2 which fills spaces among the LED elements 3; the substrate 4 on which the LED elements 3 and the reflection plate 2 are set and which is made of a material such as an aluminum plate and also serves as a heat radiation plate; a heat sink 19 which transmits heat

from the LED elements 3 to the heat radiation plate; and the diffusion plate 1 which is located in an upper position and is transparent but diffuses light, and in that the linear light sources are arranged on a slope with linear projected portions protruding from the substrate 4. Here, the “reflection plate 2 which fills spaces among the LED elements 3” means the reflection plate 2 which is arranged as shown in Figs. 2 and 3, but may be the reflection plate 2 which is arranged as shown in Fig. 4.

Please replace the paragraph beginning on page 16, line 17 with the following amended paragraph:

A surface lighting ~~device~~ device 60 shown in Fig. 8 includes; linear light sources in which the LED elements 3 are arranged continuously; a heat sink 19 which transmits heat from the LED elements 3 to a heat radiation plate; the reflection plate 2 which fills spaces among the linear light sources; the substrate 4 on which the LED elements 3 and the reflection plate 2 are set and which is made of a material such as an aluminum plate and also serves as a heat radiation plate; and the diffusion plate 1 which is located in an upper position and is transparent but diffuses light, and the linear light sources are arranged on both sides of a vertical plate protruding from the substrate 4. Here, the “reflection plate 2 which fills spaces among the linear light sources” means the reflection plate 2 which is arranged as shown in Figs. 2 and 3, but may be the reflection plate 2 which is arranged as shown in Fig. 4.

Please replace the paragraph beginning on page 17, line 9 with the following amended paragraph:

By setting the LED elements 3 both the sides of the vertical plate continuously, in the case in which the continuously arranged LED elements 3 are considered as linear light sources, the same state as setting the irradiation angle at the peak amount of light to 90 degrees is realized as shown in Fig. 8. Therefore, according to a visual recognition test for unevenness of color as shown in Fig. 6, there is a further effect that visual recognition of unevenness of color can be reduced. In Fig. 6, the term “L” represents the pitch between light emitting sources and the term “H” represents the distance between the light emitting sources and an optical plate (such as shown in Figure 10).

Please replace the paragraph beginning on page 17, line 14 with the following amended paragraph:

A surface lighting ~~device~~ device 70 shown in Fig. 10 is characterized by including; green linear light sources G-LED35 in which green LED elements having the prisms 6 adhered to light-emitting surfaces thereof are arranged continuously; blue linear light sources B-LED36 in which blue LED elements having the prisms 6 (such as in Figure 4) adhered to light-emitting surfaces thereof are arranged continuously; red linear light sources R-LED34 in which red LED elements having the prisms 6 adhered to light-emitting surfaces thereof are arranged continuously; the reflection plate 2 not illustrated in the figure which fills spaces among the linear light source; the substrate 4 on which the LED elements 3

elements of the respective colors and the reflection plate 2 are set and which is made of a material such as an aluminum plate and also serves as a heat radiation plate; and the diffusion plate 1 which is located in an upper position and is transparent but diffuses light, and in that the prisms 6 are adhered to the light-emitting surfaces of the LED elements of the respective primary colors to make it possible to change maximum light-emitting angles of the LED elements of the respective colors. In addition, as shown in Fig. 10, the surface lighting device is characterized in that, when a height from the substrate 4 to the diffusion plate 1 is H, and a period of repetition of a set of linear light-emitting sources, which consists of the red linear light source R-LED34 indicated by sign R, the blue linear light source B-LED36 indicated by sign B, and the green linear light source G-LED35 indicated by sign G, is L, the following expression is satisfied.

Please replace the paragraph beginning on page 19, line 23 with the following amended paragraph:

A surface lighting ~~device~~ device_80 shown in Fig. 11 is characterized by including; green linear light sources G-LED35 in which green LED elements having the prisms 6 adhered to light-emitting surfaces thereof are arranged continuously; blue linear light sources B-LED36 in which blue LED elements having the prisms 6 (such as in Figure 4) adhered to light-emitting surfaces thereof are arranged continuously; red linear light sources R-LED34 in which red LED elements having the prisms 6 adhered to light-emitting surfaces thereof are arranged continuously; the reflection plate 2 not illustrated in the figure

which fills spaces among the linear light source; the substrate 4 on which the LED elements 3 and the reflection plate 2 are set and which is made of a material such as an aluminum plate and also serves as a heat radiation plate; and the diffusion plate 1 which is located in an upper position and is transparent but diffuses light, and in that the prisms 6 are adhered to the light-emitting surfaces of the LED elements of the respective primary colors to make it possible to change maximum light-emitting angles of the LED elements of the respective colors. In addition, as shown in Fig. 10, the surface lighting device- device 70 is characterized in that, when a height from the substrate 4 to the diffusion plate 1 is H, and a period of repetition of a set of linear light-emitting sources, which consists of the red linear light source R-LED34 indicated by sign R, the blue linear light source B-LED36 indicated by sign B, and the green linear light source G-LED35 indicated by sign G, is L, the height H and the period L are adjusted to put an amount of light in the surface within a range of 80% to 125% in the case in which an average amount of light in the surface is assumed to be 100%.

Please replace the paragraph beginning on page 20, line 25 with the following amended paragraph:

Therefore, according to the surface lighting device ~~shown~~ shown 80 in Fig. 11, in the case in which, for example, it is assumed that ϕ_0 is an amount of light at an irradiation angle 0, ϕ_2 is an amount of light at an irradiation angle θ , and ϕ_1 is an amount of light at an irradiation angle θ' , an amount of light immediately above the green linear light sources G-LED35 is represented as $(\phi_0 + 2 \times \phi_2 \times \cos 3\theta)$. There is an effect that fluctuation of an

amount of light in the surface represented by an amount of light immediately above the center of two columns of the green linear light sources G-LED35 ($2 \times \phi 1 \times \cos 3\theta'$) can be reduced, a substantially fixed amount of light can be obtained immediately below the diffusion plate 1, and unevenness of color can be reduced. Note that, although red, blue and green are selected as a combination of plural colors, the same effect is realized even if cyan, magenta, yellow and the like, which are intermediate colors, are further added.

Please replace the paragraph beginning on page 21, line 14 with the following amended paragraph:

A surface lighting ~~device~~ device 90 shown in Fig. 12 includes; linear light sources in which the LED elements 3 are arranged continuously; the reflection plate 2 ~~not~~ shown in the figure which fills spaces among the linear light sources; the substrate 4 on which the LED elements 3 and the reflection plate 2 are set and which is made of a material such as an aluminum plate and also serves as a heat radiation plate; and the diffusion plate 1 which is located in an upper position and is transparent but diffuses light. Here, the diffusion plate 1 is a diffusion plate formed of a transparent acrylic resin plate provided with recesses and protrusions for scattering light on a surface thereof or a diffusion plate formed of transparent acrylic resin with particles for scattering light contained therein and formed in a plate shape. Thus, the diffusion plate constituting the surface lighting device shown in Fig. 11 is characterized in that a gain is limited to about 1.5 to 0.8 by adjusting a degree of recessed and protrusions on the surface, a size of the scattering particles and a thickness of

the diffusion plate. Note that, the gain of the diffusion plate is a value represented by the following expression if it is assumed that transmitted light of vertical luminance of B candela is obtained when incident light of L lux is vertically irradiated on the diffusion plate.

Please replace the paragraph beginning on page 23, line 11 with the following amended paragraph:

A surface lighting device 100 shown in Fig. 14 is characterized by including; linear light sources in which red light-emitting LEDs 7, blue light-emitting LEDs 8, and green light-emitting LEDs 9 are linearly arranged in a unit length L1 as groups, and the plural groups are further arranged linearly at an interval L1; the reflection plate 2 not shown in the figure which fills spaces among the linear light sources; the ~~substrate 4~~ substrate on which the LED elements 3 and the reflection ~~plate 2~~ plate are set and which is made of a material such as an aluminum plate and also serves as a heat radiation plate; and the diffusion plate 1 which is located in an upper position and is transparent but diffuses light. In addition, the surface lighting device 100 is characterized in that an arrangement order of the light-emitting LEDs of the respective primary colors is fixed in all the linear light-emitting sources, the linear light sources are arranged at an interval of D1 to form a surface light source, the LEDs of the same primary color form a square, and a height from the linear light sources to the diffusion plate 1 is H1.

Please replace the paragraph beginning on page 24, line 2 with the following amended paragraph:

According to the surface lighting device 100 shown in ~~Fig. 15,~~ Fig. 14, since the LEDs of the same primary color are arranged so as to form a square, there is an effect that a range of fluctuation in an amount of light in the surface can be reduced and white light without unevenness of color can be obtained by composition of light of respective primary colors. Note that, although red, blue and green are selected as a combination of plural colors, the same effect is realized even if cyan, magenta, yellow and the like, which are intermediate colors, are further added.

Please replace the paragraph beginning on page 26, line 14 with the following amended paragraph:

Fig. 17 shows an arrangement of light-emitting element groups in a surface lighting device 120. The surface lighting device 120 is characterized by including; a surface light source constituted by arranging the red light-emitting LEDs 7, the blue light-emitting LEDs 8, and the green light-emitting LEDs 9 to be contiguous with each other in a shape of delta groups (hereinafter referred to as “ Δ groups”) and further arranging the Δ groups in a delta shape (hereinafter referred to as “ Δ arrangement”); the reflection ~~plate 2~~ plate not shown in the figure which fills spaces among the light-emitting LEDs of the respective primary colors constituting the surface light source; the ~~substrate 4~~ substrate on which the LED ~~elements 3~~ elements and the reflection ~~plate 2~~ plate are set and which is made of a

material such as an aluminum plate and also serves as a heat radiation plate; and the diffusion ~~plate~~ plate which is located in an upper position and is transparent but diffuses light. In addition, the surface lighting device 120 is characterized in that, by adjusting the row interval D1, the column interval D2, and the arrangement angle θ of the Δ groups, when sums of amounts of light of the LEDs of the respective primary colors are compared in a center 1 and a center 2 of a blank area in which the light-emitting LED elements of the primary colors are not arranged, in the case in which an average value of sums of amounts of light is assumed to be 100%, the sum of amounts of light is in a range between 75% and 125%. Here, the center 1 means a center of gravity of three LED Δ groups in the Δ arrangement, and the center 2 means a center of gravity of four LED Δ groups in a diamond arrangement consisting of two Δ arrangements. Incidentally, in the case in which attention is paid to two LED Δ groups which face each other when the LED Δ groups are in the Δ arrangement, it is desirable that the LED Δ groups are arranged such that light-emitting elements of different colors face each other. This is because the characteristic concerning the sum of amounts of light can be easily attained.

Please replace the paragraph beginning on page 29, line 11 with the following amended paragraph:

Fig. 18 shows an arrangement of light-emitting element groups in a surface lighting device 130. The surface lighting device 130 characterized by including; a surface light source constituted by arranging the red light-emitting LEDs 7, the blue light-emitting

LEDs 8, and the green light-emitting LEDs 9 to be contiguous with each other in a shape of delta groups (hereinafter referred to as “ Δ groups”) and further arranging the plural Δ groups in a square shape (hereinafter referred to as “square arrangement”); the reflection ~~plate-2~~ plate not shown in the figure which fills spaces among the light-emitting LEDs of the respective primary colors constituting the surface light source; the ~~substrate-4~~ substrate on which the LED ~~elements-3~~ elements and the reflection ~~plate-2~~ plate are set and which is made of a material such as an aluminum plate and also serves as a heat radiation plate; and the diffusion ~~plate-1~~ plate which is located in an upper position and is transparent but diffuses light. In addition, the surface lighting device 130 is characterized in that, by adjusting the row interval D1, the column interval D2, and the arrangement angle θ among the Δ groups, when sums of amounts of light of the LEDs of the respective primary colors are compared in a center 1 of a blank area in which the light-emitting LED elements of the primary colors are not arranged, the sum of amounts of light is in a range between 75% and 125%. Here, the center 1 means a center of gravity of four LED Δ groups in the square arrangement. Incidentally, in the case in which attention is paid to two LED Δ groups which face each other when the LED Δ groups are arranged in a square, it is desirable to arrange the LED Δ groups such that light-emitting elements of different colors face each other. This is because the characteristics concerning the sum of amounts of light can be easily attained.

Please replace the paragraph beginning on page 31, line 24 with the following amended paragraph:

Fig. 19 shows an arrangement of light-emitting element groups in a surface lighting device 140. The surface lighting device 140 is characterized by including; a surface light source constituted by arranging four LED elements, which are constituted by the red light-emitting LEDs 7, the blue light-emitting LEDs 8, and the green light-emitting LEDs 9, to be contiguous with each other in a shape of groups of a square shape (hereinafter referred to as “square shape groups”) and further arranging the square shape groups in a delta shape (hereinafter referred to as “ Δ arrangement”); the reflection ~~plate 2~~ plate not shown in the figure which fills spaces among the light-emitting LEDs of the respective primary colors constituting the surface light source; the ~~substrate 4~~ substrate on which the LED elements 3 and the reflection ~~plate 2~~ plate are set and which is made of a material such as an aluminum plate and also serves as a heat radiation plate; and the diffusion ~~plate 1~~ plate which is located in an upper position and is transparent but diffuses light. In addition, the surface lighting device 140 is characterized in that, by adjusting the row interval D1, the column interval D2, and the arrangement angle θ among the Δ groups, when sums of amounts of light of the LEDs of the respective primary colors are compared in a center 1 and a center 2 of a blank area in which the light-emitting LED elements of the primary colors are not arranged, in the case in which an average value of sums of amounts of light is assumed to be 100%, the sum of amounts of light is in a range between 75% and 125%. Here, the center 1 means a center of gravity of three LED square shape groups in the Δ arrangement, and the center 2 means a

center of gravity of four LED square shape groups in a diamond arrangement consisting of two Δ arrangements. Incidentally, in the case in which attention is paid to two LED Δ groups which face each other when the LED Δ groups are in the Δ arrangement, it is desirable that the LED Δ groups are arranged such that light-emitting elements of different colors face each other. This is because the characteristic concerning the sum of amounts of light can be easily attained.

Please replace the paragraph beginning on page 34, line 24 with the following amended paragraph:

Fig. 20 shows an arrangement of light-emitting element groups in a surface lighting device 150. The surface lighting device 150 is characterized by including: a surface light source constituted by arranging four LED elements, which are constituted by the red light-emitting LEDs 7, the blue light-emitting LEDs 8, and the green light-emitting LEDs 9, to be contiguous with each other in a shape of groups of a square shape (hereinafter referred to as “square shape groups”) and arranging the plural square shape groups in a square shape (hereinafter referred to as “square arrangement”); the reflection ~~plate 2~~ plate not shown in the figure which fills spaces among the light-emitting LEDs of the respective primary colors constituting the surface light source; the ~~substrate 4~~ substrate on which the LED ~~elements 3~~ elements and the reflection ~~plate 2~~ plate are set and which is made of a material such as an aluminum plate and also serves as a heat radiation plate; and the diffusion ~~plate 1~~ plate which is located in an upper position and is transparent but diffuses light. In addition, the surface

lighting device 150 is characterized in that, by adjusting the row interval D1, the column interval D2, and the arrangement angle θ among the square shape groups, when sums of amounts of light of the LEDs of the respective primary colors are compared in a center 1 of a blank area in which the light-emitting LED elements of the primary colors are not arranged, the sum of amounts of light is in a range between 75% and 125%. Here, the center 1 means a center of gravity of three LED square shape groups in the square arrangement. Incidentally, in the case in which attention is paid to two LED Δ groups which face each other when the LED Δ groups are in the square arrangement, it is desirable that the LED Δ groups are arranged such that light-emitting elements of different colors face each other. This is because the characteristic concerning the sum of amounts of light can be easily attained.